V. *Some ſelect Aſtronomical Obſervations made at* Chelſea, *Latitude* 42° 25′, *and* 26″ *in Time Eaſt of the Univerſity at* Cambridge. *By the Rev.* PHILLIPS PAYSON, *F. A. A.*

THE uſe of aſtronomical obſervations, to promote the purpoſes of navagation and geography, muſt be evident to every perſon that has paid any proper attention to the ſubject. By comparing obſervations made in different places, it is well known, ſpecial advantages accrue; and by tranſmiting thoſe of one age down to another, affords aſtronomers, in future time, great helps for improvement: And no doubt but improvements will be made in this divine ſcience to the end of time.

The extenſive territories of the United States of *America*, are a foundation in nature for a vaſt empire.—The geography of its interior parts, though of great importance, is, at preſent, but little better than conjectural: To perfect which, and fix the intereſting boundaries and lines, the beſt, and indeed the only proper method is, that of aſtronomical obſervations, which, it is probable, the Supreme Council of *America* will ſoon adopt, now the glorious revolution is ſo happily compleated. To promote ſuch obſervations, both at noted head-lands upon the ſea-coaſt, and at diſtant places in the interior country, highly merits the attention of this Academy: For though they ſhould not at firſt be made with ſuch accuracy as modern aſtronomy can boaſt of, they will prove great helps for future improvements.

The mode of obſervation, to determine the latitude of a place, is of very eaſy acquiſition: Nor is that difficult which ſettles its longitude, if a perſon can be furniſhed with a good time-piece, *Hadley's*

Hadley's quadrant, and a tolerable teleſcope. The eclipſes of Jupiter's ſatellites being ſo frequent, and of ſuch eaſy obſervation, they prove very favourable phenomena for this purpoſe.

But where great accuracy is required, a ſolar eclipſe or an occultation of a ſtar by the dark ſide of the moon, are to be prefered.

Several places in this and ſome other ſtates in the union, have been determined in reſpect to each other, with much preciſion, from obſervations of late years. Such as ſhall be made in future, may correct ſome errors of the preſent.

The following obſervations were made with much care and attention. The clock was an excellant good one, regulated by equal altitudes of the ſun taken by reflection with *Hadley's* quadrant: It was counted by a perſon much uſed to the thing; and in all of them, ſpecial care was taken in adjuſting the equation of equal altitudes for the decreaſe or increaſe of the ſun's declination.

The glaſs uſed, is a reflecting teleſcope, made by *Nairne*, better than 2 feet in length, and magnifying about 55 times. In a clear air, it ſhows the ſatellites of Jupiter to be nearly of the bigneſs of ſtars of the firſt magnitude.

Emerſions of Jupiter's ſatellites in the year 1779.

1ſt. Sattelite.

	App. Time.
April 22,	$10^h\ 37'\ 3''$
May 8,	$8\ 57\ 19$
15,	$10\ 52\ 7$
June 23,	$9\ 16\ 40$

2d. Satellite.

	App. Time.
May 29,	$8^h\ 58'\ 00''$
June 30,	$8\ 39\ 15$

3d. Satellite.

May 16,	$8\ 54\ 20$
23,	$12\ 52\ 40$
June 28,	$8\ 36\ 1$

Obſervations

Obſervation of a ſolar eclipſe, June 24, 1778.

	App. Time.
Beginning, A. M.	9h. 6′ 42″
Middle,	10 21 55
End exact,	11 38 23

Obſervation of a lunar eclipſe, May 29, 1779.

Immerſion ☽'s S. E. limb,	10 15 44
Ditto ☽'s N. W. limb,	11 31 16
Emerſion ☽'s N. E. limb,	12 50 42
Ditto ☽'s S. W. limb,	14 5 55

Obſervation of a ſolar eclipſe, October 27, 1780.

Beginning,	11 00 58
Immerſion of four ſpots, nearly in a line, juſt above the ☉'s center. Spot 1ſt. Plate II. Fig. I.	11 33 6
2d.	11 34 15
3d.	11 35 6
4th.	11 36 18
Immerſion of a large ſpot nearly in the ☉'s center.	
Beginning,	11 36 18
Spot covered, i. e. end,	11 37 20
Emerſion of the four ſpots above the ☉'s center.	
Spot 1ſt.	12 53 3
2d.	12 54 23
3d.	12 55 5
4th.	12 56 9
Emerſion of the large ſpot near the ☉'s center.	
Beginning,	12 56 44
Compleated,	12 57 45
Eclipſe ended,	1 40 37
Duration,	2 39 39

At

At $11^{h.}$ 15′, mercury in the thermometer ſtood at 59°.—It ſank gradually; and at $12^{h.}$ 30′, ſtood at 51°.—Then gradually roſe to 59°, at $1^{h.}$ 15′. A little before $12^{h.}$, there appeared a large halo, or circle, around the ſun, and continued for ſome time.

Obſervation of a lunar eclipſe, November 11, 1780.

	App. Time.
Beginning,	$10^{h.}$ 27′ 15″
End,	1 18 50
Duration,	2 51 35

Obſervation of a ſolar eclipſe, April 12, 1782.

Beginning not obſerved, the face of the ſun being covered with clouds.

Correct app. time of the end of the eclipſe, P. M. 2 52 21

Obſervation of a tranſit of Mercury over the ſun, November 12, 1782.

Firſt ext. contact obſerved a few ſeconds too late,	10 7 41
Firſt internal ditto,	10 12 36
Second internal ditto,	11 23 31
Second external ditto,	11 28 58
Duration of the tranſit,	1 21 17